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National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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Seattle, WA 98115-0070

July 18, 2002

Larry Dawson
Clearwater National Forest
12730 Highway 12
Orofino, Idaho 83544

RE: Endangered Species Act Section 7 Consultation: Biological Opinion and
Magnuson-Stevens Act Essential Fish Habitat Consultation for the Culvert Replacement
Project for Steelhead in the Lolo Creek and Lochsa River Drainages (14 projects)

Dear Mr. Dawson,

This document transmits the National Marine Fisheries Service's (NMFS) biological opinion (Opinion) for proposed culvert replacements in Lolo Creek and the Lochsa River. The Opinion is based on NMFS' review of the proposed project and its effects on Snake River steelhead (*Oncorhynchus mykiss*), in accordance with the Endangered Species Act (ESA), and the project's effects on Essential Fish Habitat (EFH) for chinook and coho salmon, in accordance with the Magnuson-Stevens Act (MSA). Formal ESA consultation is conducted under the authority of section 7(a)(2) of the ESA and its implementing regulations, 50 CFR Part 402. The EFH consultation is conducted under the authority of section 305 (b)(2) of the MSA and its implementing regulations, 50 CFR Part 600.

The Clearwater National Forest (CNF) determined in the March 15, 2001, biological assessment (BA) for the proposed culvert replacement project that the proposed action is likely to adversely affect listed Snake River steelhead, and not likely to adversely affect EFH for chinook or coho salmon. This Opinion is based on information in the BA provided by the CNF, and on literature cited in the Opinion. The enclosed document includes analysis supporting NMFS' section 7 determination, an incidental take statement, and EFH consultation for the proposed action. Pursuant to ESA consultation, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Snake River steelhead. Pursuant to EFH consultation, NMFS concludes that the proposed action will not adversely affect EFH for chinook or coho salmon.

Please note that this Opinion includes reasonable and prudent measures to avoid or minimize take, and mandatory terms and conditions to implement those measures.



If you have any questions, please contact Bob Ries at (208) 882-6148 or Dale Brege at (208) 983-3859.

Sincerely,

for Michael R Couse

D. Robert Lohn
Regional Administrator

Enclosure

cc: B. Ruesink - USFWS
J. Hanson - IDFG
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Endangered Species Act Section 7 Consultation
Biological Opinion
and
Magnuson-Stevens Act
Essential Fish Habitat Consultation

Culvert Replacements
on
Lolo Creek and Lochsa River
Idaho and Clearwater Counties, Idaho

Agency: Clearwater National Forest

Consultation Conducted By: National Marine Fisheries Service,
Northwest Region

Date Issued: 7/18/2002

Issued by: 
D. Robert Lohn
Regional Administrator

Refer to: 2001/01425

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I. INTRODUCTION

The Clearwater National Forest (CNF) proposes to replace culverts at four road crossings in Lolo Creek and at 10 crossings in the Lochsa River to increase their size to accommodate 100-year flood events or to improve fish migration through them. The existing culverts to be replaced either are under-sized, or limit or prevent the upstream migration of fish and other aquatic organisms. Replacement of the culverts would restore fish access to nearly 30 miles of aquatic habitat in the Lochsa River drainage, and 8 miles in the Lolo Creek drainage. The CNF is proposing the actions according to its authorities under the Organic Act of 1897, Multiple-Use Sustained Yield Act of 1960, and National Forest Management Act of 1976.

A. Background and Consultation History

The CNF prepared a draft biological assessment (BA) in February 2001. The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) reviewed the draft BA and provided editorial recommendations. The CNF initiated formal consultation on the proposed culvert replacements in a letter and BA, dated March 15, 2001, and received by NMFS on March 16, 2001. A supplemental BA describing the effects of the action on Essential Fish Habitat (EFH) for chinook and coho salmon was received by NMFS on April 4, 2001. The BA concluded that the proposed action is likely to adversely affect Snake River steelhead and the supplemental BA concluded that the action is not likely to adversely affect EFH for chinook or coho salmon.

B. Proposed Actions

Proposed actions are defined by NMFS regulations (50 CFR 402.02) as “all activities or programs of any kind authorized, funded, or carries out, in whole or in part, by Federal agencies in the United States or upon the high seas.” Because the CNF will carry out the proposed action, a Federal nexus exists for interagency consultation under the Endangered Species Act (ESA) section 7(a)(2). The culvert replacements would occur in Lolo Creek and the Lochsa River, which are tributaries to the Clearwater River (Hydrologic Unit 17060306).

The proposed culvert replacements (Table 1) would occur in the next three years, with scheduling dependent on availability of funds. All actions could occur in a single season, or may be spread out over three years. The new culverts would replace existing culverts with either over-sized culverts placed at the natural stream grade and countersunk to allow for gravel deposition within the culvert, or bottomless culverts. East Fork Papoose Creek culverts #1 and #2, and the Doe Creek culverts may be bottomless structures. Instream work would begin after July 1, at low-elevation sites, or after July 15, at high elevation sites (Doe, Parachute, and East Fork Papoose Creeks), and be completed by August 15. The stream at each location will be diverted via a temporary culvert, or dewatered by pumping the water around the work site with a screened pump. The CNF expects that streams will be diverted from three to seven days at each site.

While the stream is diverted or dewatered, culverts would be removed and the sites excavated to hold the new and larger culverts. After installation, the contractor will cover the pipes and resurface the roads. All exposed soil would be seeded with grasses to prevent erosion. Detailed maps of the culvert locations are provided in the BA.

In instances where juvenile steelhead are in the immediate work area during instream work activities, the CNF will construct temporary block nets above and below the culvert to capture and relocate any steelhead found in the immediate vicinity of the culvert, and to prevent steelhead from moving into the construction site during replacement activities. Juvenile steelhead trapped between the nets would be captured with seines, dip nets, or electroshocking, and relocated downstream to nearby pools, where they would not likely be disturbed by instream work.

Table 1. Legal description of culvert replacement locations.

Lochsa River Drainage

Badger Creek	T37N/R13E/Sec. 33
Doe Creek	T37N/R12E/Sec. 23
Parachute Creek - Mouth	T37N/R13E/Sec. 24
Parachute Creek - Upper	T37N/R14E/Sec. 16
East Fork Papoose Creek #1	T37N/R14E/Sec. 18
East Fork Papoose Creek #2	T37N/R14E/Sec. 18
East Fork Papoose Creek #3	T37N/R14E/Sec. 7
Wendover Creek - Lower	T37N/R13E/Sec. 23
Wendover Creek - Upper	T37N/R13E/Sec. 26
West Fork Wendover Creek	T37N/R13E/Sec. 22

Lolo Creek Drainage

Chamook Creek	T35N/R6E/Sec. 11
Mox Creek	T35N/R6E/Sec. 11
Gold Creek	T35N/R6E/Sec. 4
Musselshell Tributary	T36N/R6E/Sec. 32

II. ENDANGERED SPECIES ACT

The ESA of 1973 (16 USC 1531-1544), as amended, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with USFWS and NMFS, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their

designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations found at 50 CFR 402.

A. Biological Opinion

The objective of this Opinion is to determine whether the proposed culvert replacements are likely to jeopardize the continued existence of Snake River steelhead.

1. Action Area

Areas affected by the culvert replacements include stream reaches downstream from replacement sites, where fine sediment may be carried, and areas upstream from replacement sites, where fish passage would be improved. An action area is defined by NMFS regulations (50 CFR Part 402) as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” The action area includes portions of the Lochsa River and Lolo Creek drainages. The action area in the Lochsa River drainage consists of all stream reaches accessible to steelhead in the Parachute, Papoose, Wendover, Badger and Doe Creek watersheds, and in the mainstem Lochsa River from Parachute to Doe Creek. The action area in the Lolo Creek drainage consists of all stream reaches accessible to steelhead in the Musselshell Creek watershed, upstream from the confluence with Jim Brown Creek; Chamook Creek watershed; and the Yoosa Creek watershed from Chamook Creek to the confluence with Lolo Creek.

2. Biological Information and Critical Habitat

The proposed culvert replacements may affect ESA-listed Snake River steelhead. Snake River steelhead were listed as threatened on August 18, 1997 (62 FR 43937), and protective regulations were established on July 10, 2000 (65 FR 42422). The Snake River steelhead Evolutionary Significant Unit (ESU) includes all remaining natural-origin populations of steelhead in the Snake River basin. The action area provides spawning and rearing habitat for steelhead. Based on life history timing of this ESU, it is likely that juvenile steelhead, and possibly incubating eggs or alevins, would be in the vicinity of the culverts during their replacement. Adult steelhead and smolts are unlikely to be present in the action area from July 1 to August 15, but they are likely to pass through the culverts in the spring. Most adults hold in the mainstem Clearwater and Middle Fork Clearwater Rivers throughout the fall and winter and ascend smaller rivers and tributaries in March and April for spawning. In the Clearwater River drainage, spawning generally occurs in April and May, depending on temperature, elevation, and water flows, typically on a rising hydrograph and prior to peak stream flow (Thurrow 1987). The eggs hatch in four to seven weeks.

with fry emerging in mid-June to mid-August. Steelhead fry generally rear in smaller streams for two years, but this stage can range from one to four years and occasionally up to seven years, with some fish becoming resident (Busby et al. 1996; Bennett 1999).

Stock status for Snake River steelhead is discussed in Attachment A. In short, the abundance of natural-origin Snake River steelhead counted at the uppermost dam on the Snake River has declined from a 4-year average of 58,300 in 1964 to a 4-year average of 8,300 ending in 1998. In general, steelhead abundance declined sharply in the early 1970s, rebuilt modestly from the mid-1970s through the 1980s, and declined again during the 1990s. Estimates of adult steelhead returning to the Clearwater River basin are not available for the Clearwater River. Redd counts and estimates of parr and smolt densities at index areas (discussed in Attachment A) generally indicate that fish production is well-below the potential, and continuing to decline.

NMFS estimates that the median population growth rate (λ) for the Snake River steelhead ESU as a whole, from 1980-1997, ranges from 0.91, assuming no reproduction by hatchery fish in the wild, to 0.70, assuming that hatchery fish reproduce in the river at the same rate as wild fish (Tables B-2a and B-2b in McClure et al. 2000). The proportion of hatchery fish in the Snake River steelhead population has been increasing with time, consequently, growth rates for the wild steelhead population are overestimated unless corrected for hatchery influence, however, the degree of hatchery influence is unknown. NMFS estimated the risk of absolute extinction for the A- and B-runs, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e., hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish (Table B-5 in McClure et al. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 for both runs (Table B-6 in McClure et al. 2000).

Additional information on the status of Snake River steelhead is described in steelhead status review (Busby et al. 1996), status review update (BRT 1997), and the draft Clearwater Subbasin Summary (CBFWA 2001).

3. Evaluating the Proposed Actions

The standards for determining jeopardy and adverse modification of critical habitat are set forth in section 7(a)(2) of the ESA as defined by 50 CFR 402.02 (the consultation regulations). In conducting analyses of habitat-altering actions under section 7 of the ESA, NMFS uses the following steps of the consultation regulations combined with The Habitat Approach (NMFS 1999): (1) Consider the status and biological requirements of the species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; (4) consider cumulative effects; and (5) determine whether the proposed action, in light of the above factors,

is likely to appreciably reduce the likelihood of species survival in the wild. In completing this step of the analysis, NMFS determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species or result in the destruction or adverse modification of critical habitat (if critical habitat is designated). If either or both are found, NMFS must identify reasonable and prudent alternatives for the action.

Because a final Recovery Plan has not been developed for Snake River steelhead, NMFS must ascribe the appropriate significance to actions to the extent available information allows. NMFS intends that recovery planning identify areas/stocks that are most critical to species conservation and recovery from which proposed actions can be evaluated for consistency under section 7(a)(2).

a. Biological Requirements in the Action Area

The first step NMFS uses when applying the ESA section 7(a)(2) to the listed ESUs considered in this Opinion is to define the species' biological requirements within the action area. NMFS also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess the current status of the listed species within the action area, NMFS starts with the determinations made in its decision to list for ESA protection the ESUs considered in this Opinion and also considers any new data that is relevant to the determination.

Relevant biological requirements are those necessary for the listed ESU's to survive and recover to naturally reproducing population sizes at which protection under the ESA would become unnecessary. This will occur when populations are large enough to safeguard the genetic diversity of the listed ESUs, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment. The interim abundance target (for recovery) in the Clearwater River is 4900 spawners (NMFS 2002). The number of spawners returning to the Clearwater River at the present time is unknown, however, the number of wild steelhead passing lower Granite Dam from 1994 to 2000 ranged from 9,436 - 20,580 fish. Assuming that adults returning to the Clearwater River are approximately 11% of the steelhead upstream from the Lower Granite Dam (based on the same proportion of smolt production capacities given in Table A-1, Appendix A), the number of adult spawners returning to the Clearwater River from 1994 to 2000 was approximately 20% - 45% of the goal of 4900 spawners.

For this consultation, the relevant biological requirements needed to meet the escapement goals are indicated by habitat characteristics that include an appropriate range of channel substrate sizes, adequate water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (Busby et al. 1996; Spence et al. 1996;

62 FR 43937, August 18, 1997; 65 FR 7764, February 16, 2000). Spawning and egg incubation require clean gravels and an ample supply of cool, well-oxygenated water. Juvenile rearing requires a complex physical environment with ample pools, shade, cover, and food production. Successful juvenile and adult migration requires ample stream flow and velocity, in-channel cover, low water temperatures, and unobstructed passage. Collectively, these features support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and growth and development to adulthood.

b. Environmental Baseline

The environmental baseline includes "the past and present impacts of all Federal, state, or private actions and other human activities in the action area, including the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of state and private actions that are contemporaneous with the consultation in progress" (50 CFR 402.02). In step 2 of NMFS' evaluation of jeopardy/adverse modification of critical habitat it evaluates the relevance of the environmental baseline in the action area to the species current status. In describing the environmental baseline, NMFS emphasizes essential elements of designated critical habitat or habitat indicators for the listed salmonid ESUs affected by the proposed action. The action area is described in section II. A. of this document. NMFS does not expect other areas of the Lolo Creek or Lochsa River watersheds to be directly or indirectly affected by the proposed action.

In general, the environment for salmonids in the Snake River Basin, including those that migrate past and downstream of the action area, has been dramatically affected by the development and operation of the Federal Columbia River Power System. Forestry, farming, grazing, road construction, hydrosystem development, mining, and urbanization have also radically reduced the quantity and quality of historic habitat conditions in much of the basin. Changes in salmonid populations are also substantially affected by variation in the freshwater and marine environments. Ocean conditions that are a key factor in the productivity of Northwest salmonid populations appear to have been in a low phase of the cycle for some time and are likely an important contributor to the decline of many stocks. The survival and recovery of these species will depend on their ability to persist through periods of low natural survival. Additional details about these effects can be found in Federal Caucus 2000; NMFS 2000; and OPB 2000.

Environmental baseline conditions in the action area were evaluated in the BA at the project site and watershed scales, using the "matrix of pathways and indicators" described in (NMFS 1996). The biological requirements of listed Snake River steelhead are not met under the environmental baseline, however, conditions have been generally improving in the action area during the past 20 years due to changes in forest management practices and restoration activities. Fish habitat conditions in Lolo Creek have improved as a result of on-going stream channel restoration efforts that began in the late 1970s, after streams were denuded of large woody debris. Fish habitat conditions in the Lochsa River vary among the tributaries, but overall, are of relatively high quality. Old logging roads have been removed in portions of the Lochsa

drainage, however, new road systems have been also been constructed, partly offsetting restoration efforts. Improvements in environmental baseline conditions in the action area would have to continue, in order to meet those biological requirements not presently met. Any further degradation or impairment in the improvement of these conditions might increase the amount of risk the listed ESUs presently face under the environmental baseline.

c. Environmental Baseline in Lolo Creek

The Lolo Creek drainage produces very few steelhead due to poor adult returns and degraded habitat conditions from historic alterations of stream channels. Steelhead production is a combination of natural and hatchery-influenced fish. Juvenile steelhead rearing and spawning are documented in the upper mainstem of Lolo Creek. The number of redds observed has been relatively low. Very little spawning has been observed in the Musselshell drainage, presumably due to fine textured substrates in the alluvial meadow systems of that drainage. Low numbers of steelhead have been observed in the lower reaches of Chamook Creek. Clearwater BioStudies, Inc. (1988) reported 88 steelhead redds in Lolo Creek during their July 1988 stream survey. The report noted that the redds were found upstream of Musselshell Creek and downstream of Yoosa Creek. Most of the redds were found in side channels or in gravel deposits created by structures installed to replace woody debris that was removed from the stream in past decades. Steelhead spawning occurs mainly in the mainstem of Lolo Creek, from Musselshell Creek to Yoosa Creek, and also in tributaries in the upper Lolo Creek and Yoosa Creek drainages. Limited spawning may also occur in the Musselshell Creek and Eldorado Creek drainages, based on observations of juvenile steelhead in those areas.

Habitat conditions in Lolo Creek tributary watersheds vary from high to low quality, with highest quality generally on Federal lands with low road densities, and lowest quality on private lands at lower elevations where the lands are developed for numerous human uses. Stream conditions in Lolo Creek have been altered by farming, grazing, conventional logging and road building

(CNF watershed BA). The CNF cited a stream and riparian survey of Browns Creek, a tributary of Musselshell Creek which is mostly on private lands, that showed the entire watershed had been either heavily grazed by cattle or logged intensively. Farming impacts occur on private lands in lower portions of the drainage, and logging, grazing, and roads systems are the dominant impacts in the upper portions of the drainage. Road density ranges from 0 to 9.80 miles/mile² and averages 4.8 miles/mile² on National Forest System lands in the Lolo Creek drainage. Timber harvest and road building have led to a modeled seven percent increase in peak runoff in the Lolo Creek watershed (Jones 1999).

In the Lolo Creek drainage, the matrix indicators for water temperature, fish passage, road density, cobble embeddedness, large woody debris, and pool quality were rated as “not properly functioning,” and pool frequency, off-channel habitat, and habitat refugia were rated as “functioning at risk.” Fuller et al. (1984) report that problems in the lower reaches of Lolo Creek include annual stream flow variations, high summer stream temperatures, high levels of

siltation and the lack of instream cover. Roads, past timber harvest and mining were attributed to the high levels of sedimentation that plague many streams in the Lolo Creek drainage. Moderate to high levels of cobble embeddedness reported by the CNF indicate reduced quality and quantity of summer and winter rearing habitat, and may be a limiting factor to fish production. Low levels of woody debris and sub-optimal levels of instream cover are noted by the CNF as limiting factors in a number of stream reaches.

d. Environmental Baseline in the Lochsa River

The Clearwater River Basin produces the majority of B-run steelhead in the Snake River ESU, and most of the Clearwater steelhead are produced in the Lochsa River subbasin. The Lochsa River subbasin has the highest observed densities of age 1+ B-run steelhead parr, and the highest percent carrying capacity (IDFG 1999). Steelhead have been observed in most of the larger tributaries to the Lochsa River, with high steelhead productivity occurring in Fish, Boulder, Deadman, Pete King, and Hungry Creeks (USFS 1999). Hatchery steelhead were used to supplement natural populations in the Lochsa River drainage before 1982, but current management does not include any hatchery supplementation within the Lochsa River drainage. Current adult returns are considered to be almost entirely wild steelhead trout progeny. The Lochsa River drainage (along with the Selway and lower Clearwater River tributary systems) is one of the only drainages in the Clearwater subbasin where steelhead populations have little or no hatchery influence (Busby et al. 1996; IDFG 2001). Thompson (1999) identified the Lochsa and Selway River systems as refugia areas for steelhead based on location, accessibility, habitat quality, and number of roadless tributaries. The Idaho Department of Fish and Game (IDFG) estimates that approximately 80% of the wild steelhead in the Clearwater River subbasin are destined for the Lochsa River and Selway River drainages.

Approximately 60% of the Lochsa drainage is designated wilderness or roadless, and the mainstem Lochsa River is part of the National Wild and Scenic Rivers System. These designations have preserved much of the habitat quality in the Lochsa River system. Land ownership is mostly Federal, with interspersed blocks of private timber lands arranged in a checkerboard pattern. Plum Creek Timber Company is the largest private land owner in the subbasin. A few commercial and residential developments are dispersed along the main stem of the Lochsa River. Timber harvest, fire suppression, and roads are the dominant human disturbances in the drainage. There are virtually no agricultural or grazing activities in the basin, and little development other than roads and timber harvest units.

Plum Creek Timber Company owns lands in the upper Lochsa River drainage that are interspersed with CNF lands in a checkerboard pattern. Plum Creek manages their lands in the action area primarily for timber production and harvest. Plum Creek timber activities are conducted under the terms of a habitat conservation plan (HCP) that was signed by NMFS on November 20, 2000. Activities covered by the HCP are expected to cause localized degradation where new roads are constructed and where timber harvest occurs; however, the HCP is expected to contribute to

improvements in the environmental baseline of the action areas, as a whole, over the next 30 years as a result of reduced sediment from roads, deferred riparian harvest, and recovery of stands that have been harvested in the past.

Factors affecting stream conditions include large wildfires that burned 49% of the drainage between 1910 to 1934, timber harvest and associated road building from the 1950s through the early 1990s, and flooding/landslides in 1995 and 1996 (Jones 1999). Road densities average 1.2 miles/mile². Idaho State Highway 12 closely parallels most of the mainstem Lochsa, and it encroaches on riparian areas and stream banks in places. A large volume of sand applied to the road surface in winter reaches the Lochsa and some of its tributaries. Both water temperature and sediment appear to be high naturally, based on similarities among roadless and developed portions of the drainage (Bugosh 1999). However, road systems are associated with numerous landslides, most notably in Papoose Creek, and with elevated fine sediment in many tributaries. Predicted sediment increases over natural levels in selected streams, range from 0% to 38%, with increases greater than 15% predicted for Pete King, Canyon, Squaw, and Papoose Creeks (Jones 1999). An analysis of fish habitat characteristics in portions of the Lochsa River subbasin by (Martin 1998) reported maximum stream temperatures ranging from 14.6°C - 19°C in spawning areas and from 17°C - 24°C in rearing areas. These temperature ranges exceed the optimum for steelhead and chinook salmon, and potential rearing areas exceed lethal limits. Elevated water temperature and sedimentation are the primary fish habitat constraints commonly reported in the subbasin.

Habitat conditions in the Lochsa River drainage are among the best in the Clearwater River basin. The principal limiting factors are elevated sediment and temperature in tributaries, and lack of suitable spawning and rearing habitat in the lower Lochsa River. Habitat conditions are variable in tributary watersheds, due mostly to patterns in the road system, wildfires, and timber harvest. The CNF found that many of the tributary watersheds in the Lochsa River drainage had one or more elements in the NMFS matrix that were impaired. Impaired habitat elements included cobble embeddedness, large woody debris, and water temperature rated as “not properly functioning;” and peak flows, fish passage, riparian conditions, stream temperature, pool quality, off-channel habitat, habitat refugia, water yield, and sediment yield rate rated as “functioning at risk.”

Hydrologic integrity of the Lochsa subbasin was rated as “high” by Quigley and Arbelbide (1997). A “high” rating was given to watersheds that had resilient vegetation; sedimentation and erosion effects attenuated by capture, release and storage of water; and diverse and productive aquatic systems as a result of nutrient cycling through infiltration and percolation. Watershed condition analyses were performed by the CNF in 1997, using variables such as modeled sediment delivery, stream bank and channel stability, and cobble embeddedness. Watershed conditions were rated “low” in Squaw Creek and Papoose Creeks, “moderate” in Pete King, Deadman, and Colt Creeks, and the remaining 19 watersheds in the Lochsa River subbasin were rated “high” (Jones 1999).

4. Analysis of Effects of the Proposed Actions

Effects of the action are defined as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing essential elements of critical habitat. Indirect effects are defined in 50 CFR 402.02 as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species or critical habitat of future activities that are induced by the proposed action and that occur after the action is completed.

"Interrelated actions are those that are part of a larger action and depend on the larger action for their justification"

(50 CFR 403.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02).

a. Effects of the Proposed Actions

In step 3 of NMFS jeopardy/adverse modification approach, it evaluates the effects of proposed actions on listed salmon and steelhead in the context of the status of the species and their habitats. To avoid jeopardy and destruction/adverse modification of habitat for listed salmon and steelhead, proposed actions generally must cause no more than minimal amounts of incidental take of the species, and also must restore, maintain, or at least not appreciably interfere with the recovery of the properly functioning condition of the various fish habitat elements within a watershed. The proposed action is expected to directly affect listed steelhead through effects of instream activities. The proposed action is expected to indirectly affect listed steelhead by improved passage through culverts. No interrelated or interdependent actions or effects are associated with the proposed action.

The BA provides a detailed analysis of the effects of the proposed actions on Snake River steelhead. The analysis is centered on application of NMFS' matrices for the each of the Lolo Creek or Lochsa River tributaries where activities would occur. In reviewing this information and accompanying narratives in the BA, NMFS focused particularly on the elements of the proposed action that have the potential to affect the fish or specific components or elements of their habitat.

Culvert replacements require instream work that involves a sequence of constructing of a temporary barrier to exclude fish from the work area (when steelhead are present), temporary diversion of water, removal of existing culverts, installation of new culverts, removal of the temporary diversions, reshaping the fill, and seeding, mulching and planting bare soils. Juvenile steelhead may be harmed or killed by the proposed action through efforts to relocate the fish, stranding fish in dewatered channels, crushing fish with construction equipment, or through deposition of sediment in redds prior to emergence of fry. Harm or mortality is most likely to

occur, in limited circumstances, where juvenile steelhead occupy the culvert being replaced, or at the inlet or outlets of the culvert, or where culverts are immediately upstream from redds where the fry have not yet emerged. Otherwise, steelhead are expected to either avoid the work area, or be too far away to be harmed or killed by instream activities or sediment. Based on the location of potential spawning areas, and observed distribution of fish, juvenile steelhead are most likely to be harmed at the Doe, Parachute and East Fork Papoose Creek sites. Juvenile steelhead are not expected to be harmed or killed by the proposed action at Wendover and Bagder Creek sites, or in any of the Lolo Creek sites.

Excavation and replacement of road fills and stream channel materials are likely to temporarily increase stream turbidity and sedimentation, and rearrange substrate materials. Based on similar culvert replacement projects on the Bitterroot, Flathead, and Lolo National Forests, each culvert replacement will produce a total of 1.5 to 2 tons of sediment, nearly all of which is expected to be redeposited within 150 feet of the culverts (USFS 2002). Turbidity created from the culvert replacements could temporarily diminish feeding downstream. Increased turbidity and sediment levels are likely to exceed the natural background levels during construction in each stream throughout the period of construction. The primary effect of increased turbidity on salmonids is diminished feeding efficiency. Fish affected by turbidity may temporarily or permanently leave the area to avoid its effects. Mortality or harm from turbidity is not expected to occur because juvenile fish will likely avoid the turbidity by moving out of the sediment plume, and the extent of turbid flows are likely to be short-lived and localized.

Deposition of sediment in spawning habitat could potentially trap steelhead fry that have not emerged from the gravels, or smother eggs; however, these effects are unlikely because most, if not all, steelhead fry in the action area typically emerge from the gravels prior to July 1, in the Lolo Creek drainage, and the majority of steelhead fry in the upper Lochsa River drainage emerge prior to July 15. In addition, little or no spawning habitat is available within several hundred feet downstream of the culvert sites. Any effects of sediment deposition in spawning gravels from culvert replacements are unlikely to persist beyond the spring runoff, since high flows would typically redistribute the sediment created by the culvert replacements over a wide area, or transport the sediment downstream. Sedimentation could reduce interstitial space and overwintering habitat, but the volume of sediment produced, and the area affected, by sediment deposition is expected to be small.

Several long-term beneficial effects are expected. Hydrologic function will be increased by reducing the probability of culvert failures and by re-establishing more natural patterns of bedload and woody debris movement. The new culverts would be sized to pass a 100-year flood and are designed to allow channel materials to deposit on the bottom of the culvert. The physical changes will remove or reduce migration impediments to steelhead and other aquatic organisms. The length of accessible steelhead habitat restored by the culvert replacement will increase by 38 miles (30 miles in the Lochsa River watershed and 8 miles in the Lolo Creek watershed).

Based on the effects described above, the proposed actions will have short-term adverse effects and a long-term beneficial effect on steelhead habitat in the action area. The production capacity

of steelhead is expected to increase in the action area as a result of the proposed action. However, changes in the lambda, as a result of restored fish passage, cannot be quantified, since the expected incremental change in egg-to-smolt survival in the action area is unknown.

b. Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Other activities within the watershed have the potential to impact fish and habitat within the action area. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being reviewed through separate section 7 consultation processes. Past Federal actions have already been added to the environmental baseline in the action area.

The action area consists mostly of Federal lands managed by the CNF, except for several square miles in the Lolo Creek drainage, timber lands owned by the Plum Creek Timber Company in the upper Lochsa River drainage, and a few residential properties scattered in both drainages. Nearly all of the non-Federal lands in the Lochsa River action area are owned and managed by Plum Creek Timber Company, which has been operating under the terms and conditions of a HCP since November 2000. The effects of foreseeable activities on Plum Creek lands have been incorporated into the environmental baseline considered in this Opinion. Extensive cattle grazing has occurred most years on private and state lands in portions of the Lolo Creek drainage, and is expected to continue. Cattle grazing has deleterious effects on riparian vegetation and stream bank stability, and may contribute cumulatively to sediment produced by culvert replacements. Other than cattle grazing, there are no known future non-Federal activities anticipated in the action area that are not already part of the environmental baseline.

5. Conclusion

The final step in NMFS' approach to determine jeopardy/adverse modification is to determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival in the wild or adversely modify critical habitat. NMFS has determined that, when the effects of the proposed action are added to the environmental baseline and cumulative effects occurring in the action area given the status of the stocks and condition of habitat, the action is not likely to jeopardize the continued existence of Snake River steelhead.

This conclusion is based on the following considerations: (1) The proposed action would restore steelhead access to nearly 30 miles of stream in the Lochsa River drainage, and 8 miles in the Lolo Creek drainage; (2) any harm or mortality resulting from the proposed action is expected to occur in rare circumstances since juvenile steelhead are not expected to be present in large numbers at all of the work sites; (3) any harm or mortality is expected to be limited in extent to the immediate area at each culvert replacement site, and limited in duration to less than one week

at a given site; and (4) sediment or turbidity from the culvert replacements would not affect the vast majority of steelhead spawning areas in the Lochsa River and Lolo Creek drainages. In reaching these determinations, NMFS used the best scientific and commercial data available.

6. Conservation Recommendations

Conservation recommendations are defined as suggestions of NMFS “regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information” (50 CFR 402.02). Section 7 (a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. NMFS worked with the CNF, prior to formal consultation, to incorporate measures to avoid or minimize adverse effects of the proposed activities. Therefore, NMFS has no additional conservation recommendations regarding the actions addressed in this Opinion.

7. Reinitiation of Consultation

This concludes formal consultation under the ESA on the proposed culvert replacements in Lolo Creek and the Lochsa River as outlined in the BA submitted on March 16, 2001. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

B. Incidental Take Statement

Sections 4(d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined in 50 CFR 222.102 as “an act that may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering.” Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2),

taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

1. Amount or Extent of Take

The proposed action is reasonably certain to result in incidental take of the listed species. NMFS is reasonably certain the incidental take described here will occur because: (1) Recent surveys indicate the listed species are known to occur in the action area; (2) the proposed action would adversely affect essential habitat features, which could result in the harm or death of steelhead eggs or fry; and (3) the proposed action includes instream work activities that harm or kill juvenile steelhead through stranding fish when dewatering, crushing fish with construction equipment, or injuring fish when moving them out of a construction area. Despite the use of best scientific and commercial data available, NMFS cannot quantify a specific amount of incidental take of individual fish or incubating eggs for this action. Instead, the extent of incidental take is described in circumstances where the amount of take cannot be quantified (50 CFR 402.14 [I]).

The extent of take is anticipated to be limited to the length of stream occupied by the culvert and extending 50 feet upstream and downstream of each culvert replacement site in Doe, Parachute, and East Fork Papoose Creek drainages. The number of juvenile fish killed or injured during instream work is expected to be low because healthy fish typically flee at the first sight of people and equipment, and few, if any redds are likely to occur within a distance where sedimentation might be large enough to prevent eggs from maturing or fry from emerging from the gravels.

2. Reasonable and Prudent Measures

Reasonable and Prudent Measures are non-discretionary measures that must be undertaken by the CNF, and must become binding conditions of any grant or permit issued by the CNF for the exemption in section 7(a)(2) to apply. The CNF has the continuing duty to regulate the activities covered in this incidental take statement. If the CNF fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of take of Snake River steelhead resulting from implementation

of the action. These reasonable and prudent measures would also minimize adverse effects on steelhead habitat.

- a. The CNF shall minimize the amount and extent of incidental take resulting from instream work activities.
- b. The CNF shall minimize the amount and extent of incidental take resulting from fuels.
- c. The CNF shall minimize the amount and extent of incidental take resulting from stream bank disturbance.
- d. The CNF monitor the impact of incidental take, and report the progress of the action and its impact on Snake River steelhead to NMFS [50 CFR §402.14(I)(3)].

3. Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the CNF must comply with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. These terms and conditions are non-discretionary.

- a. To implement Reasonable and Prudent Measure (a) - minimize the amount and extent of incidental take resulting from instream work activities, the CNF shall:
 - (1) Conduct all instream culvert activities from July 15 to August 15 at the sites in Doe Creek, Parachute Creek and Papoose Creek, and July 1 to August 15 at all other culvert sites.
 - (2) Operate equipment used for culvert replacements from existing roads or the streambank (construction equipment will not enter the active stream).
 - (3) Require operators of construction equipment to immediately cease operation if dead or injured steelhead are observed, and contact the CNF. The CNF shall contact NMFS before resuming activities.
 - (4) Survey each culvert, prior to operating construction equipment, to determine if steelhead are present at the culvert site, and subsequently, if a temporary fish barrier is needed. Surveys will be conducted by looking for fish from the stream bank with polarized glasses or by snorkeling. If steelhead are present, CNF personnel shall construct a temporary fish barrier above and below the construction site using a block net, or similar arrangement. The net should be installed to prevent fish from entering the construction area, and the net shall remain in place for the duration of instream work. Any steelhead present in between the nets shall be captured and moved downstream from the construction area, and released in a suitable pool.

- (5) Divert stream flow around culvert removal/ replacement sites through a temporary culvert, or a trench lined with plastic, rocks, or other suitable material that prevents erosion.
- b. To implement Reasonable and Prudent Measure (b) - minimize the amount and extent of incidental take from fuels, the CNF shall:
 - (1) Locate areas for fuel storage and construction equipment refueling at least 100 feet away from any water body, and have available spill containment materials at each project site.
- c. To implement Reasonable and Prudent Measure (c) - minimize the likelihood of incidental take resulting from stream bank disturbance) the CNF shall:
 - (1) Use appropriate sediment control measures at culvert replacement sites (e. g. silt fences, straw bales) to minimize sediment transport into the stream channel and downstream from the project sites.
 - (2) Minimize disturbance of existing vegetation at the culvert replacement sites.
 - (3) Reseed and replant all areas disturbed by construction activities with native grasses, shrubs, or trees.
- d. To implement Reasonable and Prudent Measure (d) - monitor the impact of incidental take, the CNF shall:
 - (1) Monitor the effectiveness of erosion control measures at the culvert replacement sites daily during implementation of the projects and on at least two occasions (e. g. one month and nine months), or more often if necessary, after completion of the projects.
 - (2) Monitor the success of plantings at the culvert replacement sites on at least three occasions (e. g. one month, six months, and one year), or more often if necessary, after completion of the projects.
 - (3) Maintain records of all listed fish removed from the work site. Records shall identify the location, date, species name, number of individuals, condition of the fish upon release, and also identify any steelhead that are injured or killed.
 - (4) Submit by March 15 of each year, the above information in an annual monitoring report, to: National Marine Fisheries Service, Grangeville Field Office, 102 N College, Grangeville, Idaho 83530.

III. MAGNUSON-STEVEN'S FISHERY CONSERVATION AND MANAGEMENT ACT

A. Background

The objective of the EFH consultation is to determine whether the proposed action(s) may adversely affect designated EFH for relevant species, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action(s).

B. Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NMFS on activities that may adversely affect EFH.

The EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species' full life cycle (50 CFR 600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;
- NMFS shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH;
- Federal agencies shall within 30 days after receiving conservation recommendations from NMFS provide a detailed response in writing to NMFS regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NMFS, the Federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH

consultation with NMFS is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

C. Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for chinook salmon (*Oncorhynchus tshawytscha*); coho salmon (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of the potential adverse effects to these species' EFH from the proposed action is based on this information.

D. Proposed Actions

The proposed actions are detailed in section I.B., above. The action area includes portions of the Lochsa River and Lolo Creek drainages. The action area in the Lochsa River drainage consists of all stream reaches accessible to steelhead in the Parachute, Papoose, Wendover, Badger and Doe Creek watersheds, and in the mainstem Lochsa River from Parachute to Doe Creek. The action area in the Lolo Creek drainage consists of all stream reaches accessible to steelhead in the Musselshell Creek watershed, upstream from the confluence with Jim Brown Creek; Chamook Creek watershed; and the Yoosa Creek watershed from Chamook Creek to the confluence with Lolo Creek. This area has been designated as EFH for various life stages of groundfish, coastal pelagics, and salmon.

E. Effects of Proposed Action

As described in detail in section II.A.4., the proposed activities may result in short-term changes to a variety of habitat parameters. The primary habitat effects are short-term increases in turbidity and cobble embeddedness, and long-term improvements in fish passage. These effects would not extend downstream to stream reaches used by chinook or coho salmon.

F. Conclusion

NMFS believes that the proposed action would not adversely affect EFH for Pacific salmon.

G. EFH Conservation Recommendations

Pursuant to the MSA section 305(b)(4)(A) of, NMFS is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. Because the proposed action does not adversely affect EFH for Pacific salmon, NMFS does not recommend any conservation measures for EFH.

H. Statutory Response Requirement

Please note that the MSA section 305(b) and 50 CFR 600.920(j) require the Federal agency to provide a written response to NMFS after receiving EFH conservation recommendations within 30 days of its receipt of these recommendations. No response is required for this action.

I. Consultation Renewal

The CNF must reinitiate EFH consultation with NMFS if either action is substantially revised or new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600.920).

IV. REFERENCES

Section 7(a)(2) of the ESA requires biological opinions to be based on "the best scientific and commercial data available." This section identifies the data used in developing this Opinion in addition to the BA and additional information requested by NMFS and provided by the CNF.

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Attachment 1

**BIOLOGICAL REQUIREMENTS, CURRENT STATUS, AND TRENDS:
SNAKE RIVER STEELHEAD**

A.1 Status of Snake River Steelhead

The Snake River steelhead Evolutionary Significant Unit (ESU), listed as threatened on August 18, 1997 (62 FR 43937), includes all natural-origin populations of steelhead in the Snake River basin of southeast Washington, northeast Oregon, and Idaho. None of the hatchery stocks in the Snake River basin are listed, but several are included in the ESU. Critical habitat was designated for Snake River steelhead on February 16, 2000 (65 FR 7764).

A.1.2 General Life History

Steelhead can be divided into two basic run-types based on the state of sexual maturity at the time of river entry and the duration of the spawning migration (Burgner et al. 1992). The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in freshwater to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns shortly after river entry (Barnhart 1986). Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, whereas others only have one run-type.

In the Pacific Northwest, summer steelhead enter fresh water between May and October (Busby et al. 1996; Nickelson et al. 1992). During summer and fall, prior to spawning, they hold in cool, deep pools (Nickelson et al. 1992). They migrate inland toward spawning areas, overwinter in the larger rivers, resume migration in early spring to natal streams, and then spawn (Meehan and Bjornn 1991; Nickelson et al. 1992). Winter steelhead enter fresh water between November and April in the Pacific Northwest (Busby et al. 1996; Nickelson et al. 1992), migrate to spawning areas, and then spawn in late winter or spring. Some adults, however, do not enter coastal streams until spring, just before spawning (Meehan and Bjornn 1991). Difficult field conditions (snowmelt and high stream flows) and the remoteness of spawning grounds contribute to the relative lack of specific information on steelhead spawning.

Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death. However, it is rare for steelhead to spawn more than twice before dying and most that do so are females (Nickelson et al. 1992). Iteroparity is more common among southern steelhead populations than northern populations (Busby et al. 1996). Multiple spawnings for steelhead range from 3% to 20% of runs in Oregon coastal streams.

Steelhead spawn in cool, clear streams featuring suitable gravel size, depth, and current velocity. Intermittent streams may also be used for spawning (Barnhart 1986; Everest 1973). Steelhead enter streams and arrive at spawning grounds weeks or even months before they spawn and are vulnerable to disturbance and predation. Cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep

water, turbulence, and turbidity (Giger 1973) are required to reduce disturbance and predation of spawning steelhead. Summer steelhead usually spawn further upstream than winter steelhead (Withler 1966; Behnke 1992).

Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months (August 9, 1996, 61 FR 41542) before hatching. Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson et al. 1992).

Juveniles rear in fresh water from 1 to 4 years, then migrate to the ocean as smolts. Winter steelhead populations generally smolt after 2 years in fresh water (Busby et al. 1996). Steelhead typically reside in marine waters for 2 or 3 years prior to returning to their natal stream to spawn at 4 or 5 years of age. Populations in Oregon and California have higher frequencies of age-1-ocean steelhead than populations to the north, but age-2-ocean steelhead generally remain dominant (Busby et al. 1996). Age structure appears to be similar to other west coast steelhead, dominated by 4-year-old spawners (Busby et al. 1996).

Based on purse seine catches, juvenile steelhead tend to migrate directly offshore during their first summer rather than migrating along the coastal belt as do salmon. During fall and winter, juveniles move southward and eastward (Hartt and Dell 1986).

A.1.3 Population Dynamics and Distribution

The following section provides specific information on the distribution and population structure (size, variability, and trends of the stocks or populations) of the Snake River ESU. Most of this information comes from observations made in terminal, freshwater areas, which may be distinct from the action area. This focus is appropriate because the species status and distribution can only be measured at this level of detail as adults return to spawn.

The longest consistent indicator of steelhead abundance in the Snake River basin is based on counts of natural-origin steelhead at the uppermost dam on the lower Snake River. The abundance of natural-origin summer steelhead at the uppermost dam on the Snake River has declined from a 4-year average of 58,300 in 1964 to an average of 8,300 ending in 1998. In general, steelhead abundance declined sharply in the early 1970s, rebuilt modestly from the mid-1970s through the 1980s, and again declined during the 1990s (Figure A-1).

These broad scale trends in the abundance of steelhead were reviewed through the Plan for analyzing and testing hypotheses (PATH) process. The PATH report concluded that the initial, substantial decline coincided with the declining trend in downstream passage survival. However, the more recent decline in abundance, observed over the last decade or more, does not

coincide with declining passage survival but can be at least partially be accounted for by a shift in climatic regimes that has affected ocean survival (Marmorek and Peters 1998).

The abundance of A-run versus B-run components of Snake River basin steelhead can be distinguished in data collected since 1985. Both components have declined through the 1990s, but the decline of B-run steelhead has been more significant. The 4-year average counts at Lower Granite Dam declined from 18,700 to 7,400 beginning in 1985 for A-run steelhead and from 5,100 to 900 for B-run steelhead. Counts over the last 5 or 6 years have been stable for A-run steelhead and without significant trend (Figure A-2). Counts for B-run steelhead have been low and highly variable, but also without apparent trend (Figure A-3).

Comparison of recent dam counts with escapement objectives provides perspective regarding the status of the ESU. The management objective for Snake River steelhead stated in the Columbia River Fisheries Management Plan was to return 30,000 natural/wild steelhead to Lower Granite Dam. The All Species Review (TAC 1997) further clarified that this objective was subdivided into 20,000 A-run and 10,000 B-run steelhead. Idaho has reevaluated these escapement objectives using estimates of juvenile production capacity. This alternative methodology lead to revised estimates of 22,000 for A-run and 31,400 for B-run steelhead (pers. comm., S. Keifer, Idaho Department of Fish and Game with P. Dygert, National Marine Fisheries Service).

The State of Idaho has conducted redd count surveys in all of the major subbasins since 1990. Although the surveys are not intended to quantify adult escapement, they can be used as indicators of relative trends. The sum of redd counts in natural-origin B-run production subbasins declined from 467 in 1990 to 59 in 1998 (Figure A-4). The declines are evident in all four of the primary B-run production areas. Index counts in the natural-origin A-run production areas have not been conducted with enough consistency to permit similar characterization.

Figure A-1. Adult Returns of Wild Summer Steelhead to the Uppermost Dam on the Snake River

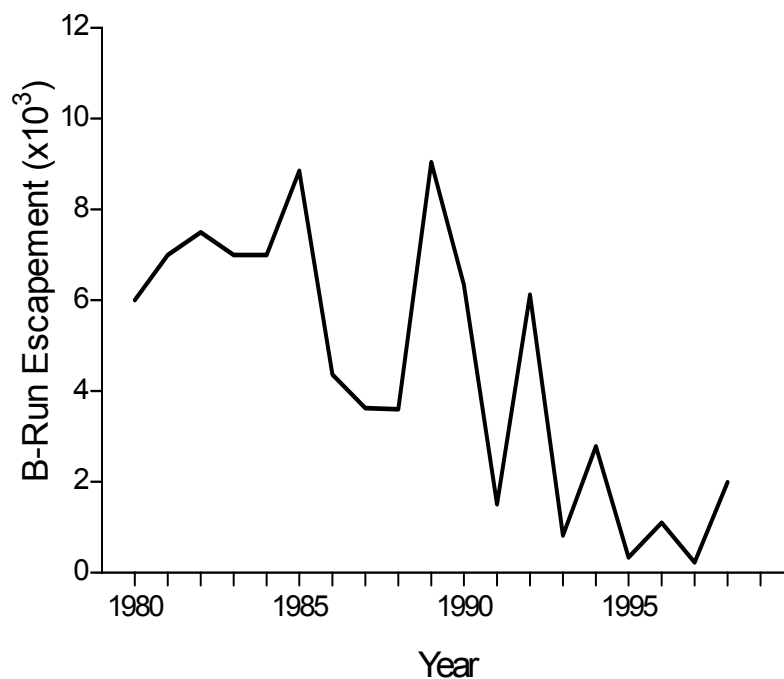
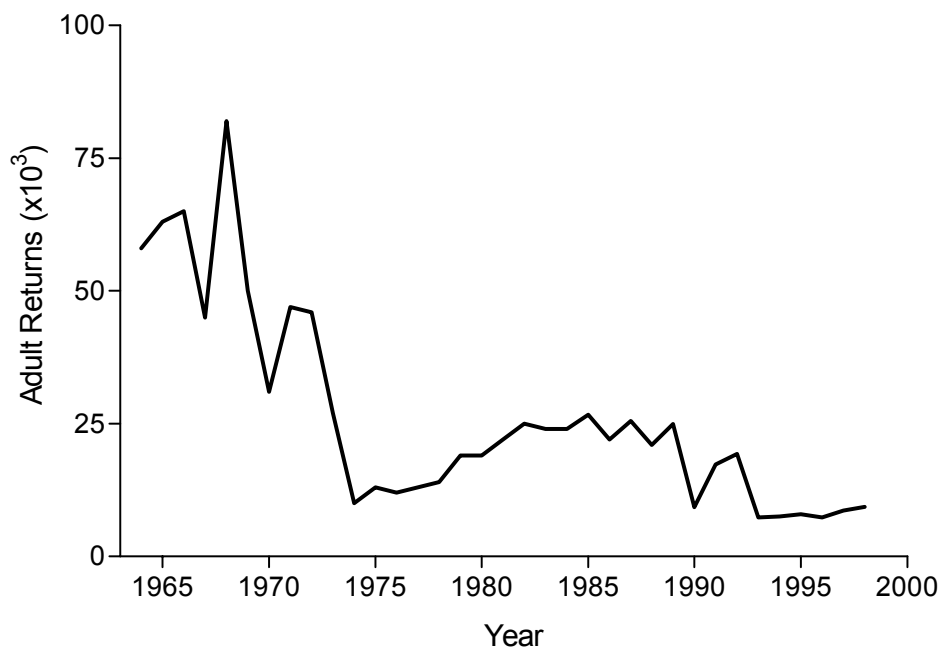


Figure A-2. Escapement of A-Run Snake River Steelhead to the Uppermost Dam¹



Figure

A-3.

¹Source: Data for 1980 through 1984 from Figures 1 and 2 of Section 8 in (TAC 1997). Data for 1985 through 1998 from Table 2 of Section 8 (TAC 1997) and pers. comm. G. Mauser, IDFG.

Escapement of B-Run Snake River Steelhead to the Uppermost Dam¹

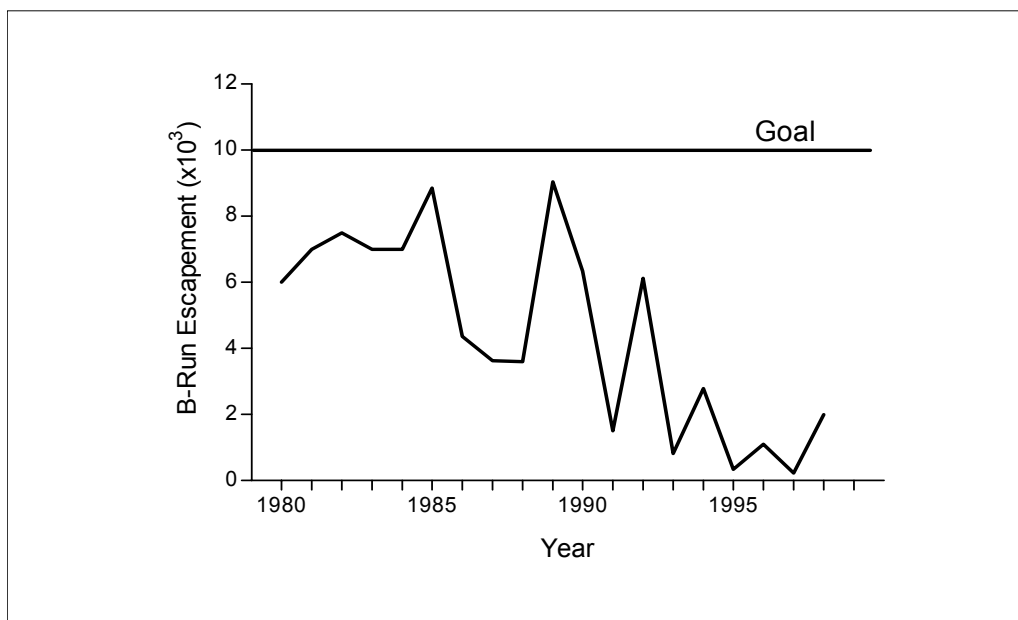
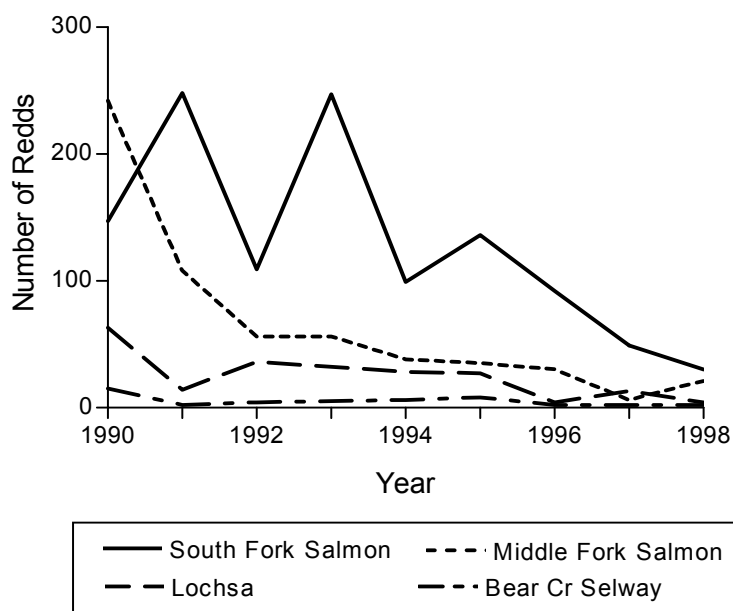


Figure A-4. Redd Counts for Wild Snake River (B-Run) Steelhead in the South Fork and Middle Fork Salmon, Lochsa, and Bear Creek-Selway Index Areas



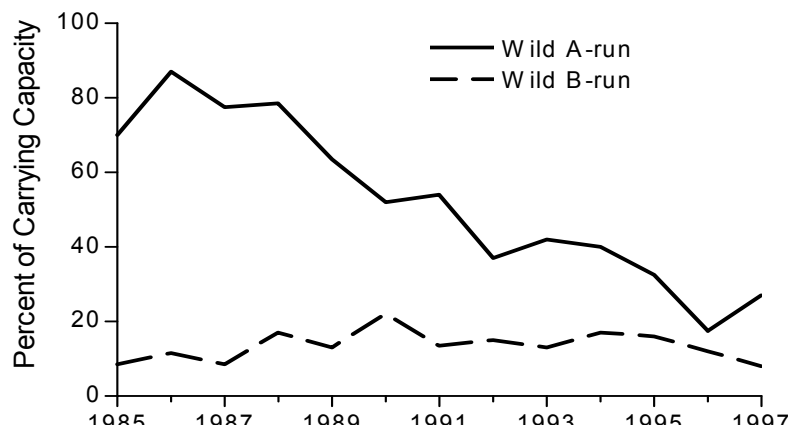
Data for the Lochsa
Fork.

exclude Fish Creek and Crooked

Sources: memo from T. Holubetz (IDFG), "1997 Steelhead Redd Counts", dated May 16, 1997, and IDFG, unpubl. data).

¹Source: Data for 1980 through 1984 from Figures 1 and 2 of Section 8 in (TAC 1997). Data for 1985 through 1998 from Table 2 of Section 8 (TAC 1997) and pers. comm. G. Mauser, IDFG.

Figure A-5. Percent of Estimated Carrying Capacity for Juvenile (Age-1+ and -2+) Wild A- and B-Run Steelhead in Idaho Streams



Source: Data for 1985 through 1996 from (Hall-Griswold and Petrosky 1998); data for 1997 from IDFG (unpublished).

Idaho has also conducted surveys for juvenile abundance in index areas throughout the Snake River basin since 1985. Parr densities of A-run steelhead have declined from an average of about 75% of carrying capacity in 1985 to an average of about 35% in recent years through 1995 (Figure A-5). Further declines were observed in 1996 and 1997. Parr densities of B-run steelhead have been low, but relatively stable since 1985, averaging 10% to 15% of carrying capacity through 1995. Parr densities in B-run tributaries declined further in 1996 and 1997 to 11% and 8% respectively.

It is apparent from the available data that B-run steelhead are much more depressed than the A-run component. In evaluating the status of the Snake Basin steelhead ESU it is pertinent to consider whether B-run steelhead represent a "significant portion" of the ESU. This is particularly relevant because the Tribes have proposed to manage the Snake River basin steelhead ESU as a whole without distinguishing between components and further that it is inconsistent with National Marine Fisheries Service (NMFS) authority to manage for components of an ESU.

It is first relevant to put the Snake River basin into context. The Snake River historically supported over 55% of total natural-origin production of steelhead in the Columbia basin and now has approximately 63% of the basin's natural production potential (Mealy 1997). B-run steelhead occupy four major subbasins including two on the Clearwater River (Lochsa and Selway) and two on the Salmon River (Middle Fork and South Fork Salmon), areas that for the most part are not occupied by A-run steelhead. Some natural B-run steelhead are also produced

in parts of the mainstem Clearwater and its major tributaries. There are alternative escapement objectives for

B-run steelhead of 10,000 (TAC 1997) and 31,400 (Idaho). B-run steelhead therefore represent at least 1/3 and as much as 3/5 of the production capacity of the ESU.

B-run steelhead are distinguished from the A-run component by their unique life history characteristics. B-run steelhead were traditionally distinguished as larger and older, later-timed fish that return primarily to the South Fork Salmon, Middle Fork Salmon, Selway, and Lochsa rivers. The recent review by the Technical Advisory Committee (TAC) concluded that different populations of steelhead do have different size structures, with populations dominated by larger fish (i.e., greater than 77.5 cm) occurring in the traditionally defined B-run basins (TAC 1999). Larger fish occur in other populations throughout the basin, but at much lower rates (evidence suggests that fish returning to the Middle Fork Salmon and Little Salmon are intermediate in that they have a more equal distribution of large and small fish).

B-run steelhead are also generally older. A-run steelhead are predominately age-1-ocean fish whereas most B-run steelhead generally spend two or more years in the ocean prior to spawning. The differences in ocean age are primarily responsible for the differences in the size of A- and B-run steelhead. However, B-run steelhead are also thought to be larger at age than A-run fish. This may be due, at least in part, to the fact that B-run steelhead leave the ocean later in the year than A-run steelhead and thus have an extra month or more of ocean residence at a time when growth rates are thought to be greatest.

Historically, a distinctly bimodal pattern of freshwater entry could be used to distinguish A-run and B-run fish. A-run steelhead were presumed to cross Bonneville Dam from June to late August whereas B-run steelhead enter from late August to October. The TAC reviewed the available information on timing and confirmed that the majority of large fish do still have a later timing at Bonneville; 70% of the larger fish crossed the dam after August 26, the traditional cutoff date for separating A- and B-run fish (TAC 1999). However, the timing of the early part of the A-run has shifted somewhat later, thereby reducing the timing separation that was so apparent in the 1960s and 1970s. The timing of the larger, natural-origin B-run fish has not changed.

As pointed out above, the geographic distribution of B-run steelhead is restricted to particular watersheds within the Snake River basin (areas of the mainstem Clearwater, Selway, and Lochsa Rivers and the South and Middle Forks of the Salmon River). No recent genetic data are available for steelhead populations in South and Middle Forks of the Salmon River. The Dworshak National Fish Hatchery (NFH) stock and natural populations in the Selway and Lochsa Rivers are thus far the most genetically distinct populations of steelhead in the Snake River basin (Waples et al. 1993). In addition, the Selway and Lochsa River populations from the Middle Fork Clearwater appear to be very similar to each other genetically, and naturally produced rainbow trout from the North Fork Clearwater River (above Dworshak Reservoir) clearly show an ancestral genetic similarity to Dworshak NFH steelhead. The existing genetic

data, the restricted geographic distribution of B-run steelhead in the Snake (Columbia) River basin, and the unique life history attributes of these fish (i.e. larger, older adults with a later distribution of run timing compared to A-run steelhead in other portions of the Columbia River basin) clearly support the conservation of B-run steelhead as a biologically significant component of the Snake River ESU.

Another approach to assessing the status of an ESU being developed by NMFS is to consider the status of its component populations. For this purpose a population is defined as a group of fish of the same species spawning in a particular lake or stream (or portion thereof) at a particular season, which to a substantial degree do not interbreed with fish from any other group spawning in a different place or in the same place at a different season. Because populations as defined here are relatively isolated, it is biologically meaningful to evaluate the risk of extinction of one population independently from any other. Some ESUs may be comprised of only one population whereas others will be constituted by many. The background and guidelines related to the assessment of the status of populations is described in a recent draft report discussing the concept of Viable Salmonid Populations (McElhany et al. 2000).

The task of identifying populations within an ESU will require making judgements based on the available information. Information regarding the geography, ecology, and genetics of the ESU are relevant to this determination. Although NMFS has not compiled and formally reviewed all the available information for this purpose, it is reasonable to conclude that, at a minimum, each of the major subbasins in the ESU represent a population within the context of this discussion. A-run populations would therefore include at least the tributaries to the lower Clearwater, the upper Salmon River and its tributaries, the lower Salmon River and its tributaries, the Grand Ronde, Imnaha, and possibly the Snake mainstem tributaries below Hells Canyon Dam. B-run populations would be identified in the Middle Fork and South Fork Salmon rivers and the Lochsa and Selway rivers (major tributaries of the upper Clearwater), and possibly in the mainstem Clearwater River, as well. These basins are, for the most part, large geographical areas and it is quite possible that there is additional population structure within at least some of these basins. However, because that hypothesis has not been confirmed, NMFS assumes that there are at least five populations of A-run steelhead and five populations of B-run steelhead in the Snake River basin ESU. Escapement objectives for A and B-run production areas in Idaho, based on estimates of smolt production capacity, are shown in Table A-1.

Table A-1. Adult Steelhead Escapement Objectives Based on Estimates of 70% Smolt Production Capacity

A-Run Production Areas		B-Run Production Areas	
Upper Salmon	13,570	Mid Fork Salmon	9,800
Lower Salmon	6,300	South Fork Salmon	5,100
Clearwater	2,100	Lochsa	5,000
Grand Ronde	(1)	Selway	7,500
Imnaha	(1)	Clearwater	4,000
Total	21,970	Total	31,400

Note: comparable estimates are not available for populations in Oregon and Washington subbasins.

Hatchery populations, if genetically similar to their natural-origin counterparts, provide a hedge against extinction of the ESU or of the gene pool. The Imnaha and Oxbow hatcheries produce A-run stocks that are currently included in the Snake River basin steelhead ESU. The Pahsimeroi and Wallowa hatchery stocks may also be appropriate and available for use in developing supplementation programs; NMFS required in its recent biological opinion on Columbia basin hatchery operations that this program begin to transition to a local-origin broodstock to provide a source for future supplementation efforts in the lower Salmon River (NMFS 1999). Although other stocks provide more immediate opportunities to initiate supplementation programs within some subbasins, it may also be necessary and desirable to develop additional broodstocks that can be used for supplementation in other natural production areas. Despite uncertainties related to the likelihood that supplementation programs can accelerate the recovery of naturally spawning populations, these hatchery stocks provide a safeguard against the further decline of natural-origin populations.

The Dworshak NFH is unique in the Snake River basin in producing a B-run hatchery stock. The Dworshak stock was developed from natural-origin steelhead from within the North Fork Clearwater River, is largely free of introductions from other areas, and was therefore included in the ESU although not as part of the listed population. However, past hatchery practices and possibly changes in flow and temperature conditions related to Dworshak Dam have lead to substantial divergence in spawn timing of the hatchery stock compared to what was observed historically in the North Fork Clearwater River, and compared to natural-origin populations in other parts of the Clearwater basin. Because the spawn timing of the hatchery stock is much earlier than it was historically (Figure A-6), the success of supplementation efforts using these stocks may be limited. In fact, past supplementation efforts in the South Fork Clearwater River using Dworshak NFH stock have been largely unsuccessful, although improvements in out-planting practices have the potential to yield different results. In addition, the unique genetic character of Dworshak NFH steelhead noted above will limit the degree to which the stock can be used for supplementation in other parts of the Clearwater subbasin and particularly in the Salmon River B-run basins. Supplementation efforts in those areas, if undertaken, will more

likely have to rely on the future development of local broodstocks. Supplementation opportunities in many of the B-run production areas will be limited in any case because of logistical difficulties in getting to and working in these high mountain, wilderness areas. Because opportunities to accelerate the recovery of B-run steelhead through supplementation, even if successful, are expected to be limited, it is essential to maximize the escapement of natural-origin steelhead in the near term.

Finally, the conclusions and recommendations of the TAC's All Species Review are pertinent to this review of the status of Snake River steelhead. Considering information available through 1996, the 1997 All Species Review stated:

Regardless of assessment methods for A and B steelhead, it is apparent that the primary goal of enhancing the upriver summer steelhead run is not being achieved. The status of upriver summer steelhead, particularly natural-origin fish, has become a serious concern. Recent declines in all stocks, across all measures of abundance, are disturbing.

There has been no progress toward rebuilding upriver runs since 1987. Throughout the Columbia River basin, dam counts, weir counts, spawning surveys, and rearing densities indicate natural-origin steelhead abundance is declining, culminating in the proposed listing of upriver stocks in 1996. Escapements have reached critically low levels despite the relatively high productivity of natural and hatchery rearing environments. Improved flows and ocean conditions should increase smolt-adult survival rates for upriver summer steelhead. However, reduced returns in recent years are likely to produce fewer progeny and lead to continued low abundance.

Although steelhead escapements would have increased (in some years substantially) in the absence of mainstem fisheries, data analyzed by the TAC indicate that effects other than mainstem Columbia River fishery harvest are primarily responsible for the currently depressed status and the long term health and productivity of wild steelhead populations in the Columbia River.

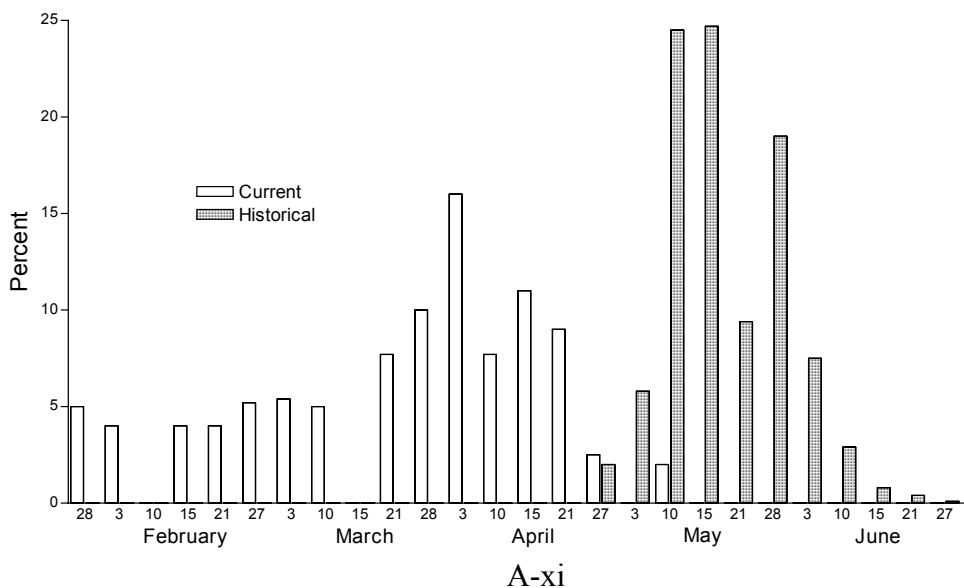
Though harvest is not the primary cause of declining summer steelhead stocks, and harvest rates have been below guidelines, harvest has further reduced escapements. Prior to 1990, the aggregate of upriver summer steelhead in the mainstem Columbia River appears at times to have led to the failure to achieve escapement goals at Lower Granite Dam. Wild Group B steelhead are presently more sensitive to harvest than other salmon stocks, including the rest of the steelhead run, due to their depressed status and because they are caught at higher rates in the Zone 6 fishery.

Small or isolated populations are much more susceptible to stochastic events such as drought and poor ocean conditions. Harvest can further increase the susceptibility of such populations. The Columbia River Fish Management Plan (TAC 1997) recognizes that harvest management must be responsive to run size and escapement needs to protect these populations. The parties should ensure that TAC 1997 harvest guidelines are sufficiently protective of weak stocks and hatchery broodstock requirements.

The All Species Review included the following recommendations:

- Develop alternative harvest strategies to better achieve rebuilding and allocation objectives.
- Consider modification of steelhead harvest rate guidelines relative to stock management units and escapement needs.

Figure A-6. Historical Versus Current Spawn-Timing of Steelhead at Dworshak Hatchery



For the Snake River steelhead ESU as a whole, the median population growth rate (λ) from years 1980-1997, ranges from 0.91 - 0.70, depending on the assumed number of hatchery fish reproducing in the river (Tables B-2a and B-2b in McClure et al. 2000). NMFS estimated the risk of absolute extinction for A- and B-runs, based on assumptions of complete hatchery spawning success, and no hatchery spawning success. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e., hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish (Table B-5 in McClure et al. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 for both runs (Table B-6 in McClure et al. 2000).

NMFS has also calculated the proportional increase in the average growth rate of each run that would be needed to reduce the risk of absolute extinction within 100 years to five percent (Tables A-2a through A-2d; Appendix B in McClure et al. 2000). Assuming that the effectiveness of hatchery fish has been zero, the needed change in the growth rate of the wild population ranges from 0.01 for A-run steelhead to 0.02 for the B run (Table A-2a). The maximum needed change in growth rate rises as high as 470% for B-run steelhead if hatchery-origin spawners have been 100% as effective as wild fish (Table A-2d).

Table A-2a. Estimated initial population size in the Dennis model analyses for individual stocks, average population growth rate (lambda), risk of absolute extinction and the proportional change in lambda needed to reduce the risk of extinction to five percent, and the risk of a 90% decline in abundance (source: Appendix B in McClure et al. 2000). This analysis incorporates the proportion of natural spawners that were of hatchery-origin but assumes that hatchery fish did not reproduce. “N/A” indicates that no hatchery data were available, that the data are peak counts and therefore not appropriate for projecting population size into the future, or that data are too sparse to perform any of these analyses.

Species	ESU	Initial Pop. Size	lambda	Risk of Extinction		Change in lambda		Risk of a 90% Decline	
				24-Year	100-Year	24-Year	100-Year	24-	100-
Steelhead									
	Snake River ESU								
	A-run	299,161	0.91	0.00	0.12	0.000	0.010	0.42	1.00
	B-run	100,455	0.92	0.00	0.35	0.000	0.020	0.38	1.00

Table A-2b. Estimated initial population size in the Dennis model analyses for individual stocks, average population growth rate (lambda), risk of absolute extinction and the proportional change in lambda needed to reduce the risk of extinction to five percent, and the risk of a 90% decline in abundance (source: Appendix B in McClure et al. 2000). This analysis incorporates the proportion of natural spawners that were of hatchery-origin but assumes that hatchery fish have been 20% as productive as spawners of wild-origin. “N/A” indicates that no hatchery data were available¹, that the data are peak counts and therefore not appropriate for projecting population size into the future, or that data are too sparse to perform any of these analyses.

perform any of these analyses:										
Species	ESU	Stream	Initial Pop. Size	lambda	Risk of Extinction		Change in lambda		Risk of a 90% Decline	
					24-Year	100-Year	24-Year	100-Year	24-Year	100-Year
Steelhead										
	Snake River ESU									
		A-run	299,161	0.52	0.99	1.00	0.360	0.835	1.00	1.00
		B-run	100,455	0.48	1.00	1.00	0.480	0.965	1.00	1.00

Table A-2c. Estimated initial population size in the Dennis model analyses for individual stocks, average population growth rate (lambda), risk of absolute extinction and the proportional change in lambda needed to reduce the risk of extinction to five percent, and the risk of a 90% decline in abundance (source: Appendix B in McClure et al. 2000). This analysis incorporates the proportion of natural spawners that were of hatchery-origin but assumes that hatchery fish have been 80% as productive as spawners of wild-origin. “N/A” indicates that no hatchery data were available, that the data are peak counts and therefore not appropriate for projecting population size into the future, or that data are too sparse to perform any of these analyses.

Species		ESU	Stream	Initial Pop. Size	lambda	Risk of Extinction		Change in lambda		Risk of a 90% Decline	
						24-Year	100-Year	24-Year	100-Year	24-Year	100-Year
Steelhead											
		Snake River ESU									
			A-run	299,161	0.23	1.00	1.00	2.170	3.285	1.00	1.00
			B-run	100,455	0.20	1.00	1.00	2.515	3.765	1.00	1.00

Table A-2d. Estimated initial population size in the Dennis model analyses for individual stocks, average population growth rate (lambda), risk of absolute extinction and the proportional change in lambda needed to reduce the risk of extinction to five percent, and the risk of a 90% decline in abundance (source: Appendix B in McClure et al. 2000). This analysis incorporates the proportion of natural spawners that were of hatchery-origin but assumes that hatchery fish have been 100% as productive as spawners of wild-origin. “N/A” indicates that no hatchery data were available, that the data are peak counts and therefore not appropriate for projecting population size into the future, or that data are too sparse to perform any of these analyses.

Species		ESU	Stream	Initial Pop. Size	lambda	Risk of Extinction		Change in lambda		Risk of a 90% Decline	
						24-Year	100-Year	24-Year	100-Year	24-Year	100-Year
Steelhead											
		Snake River ESU									
			A-run	299,161	0.19	1.00	1.00	2.765	4.100	1.00	1.00
			B-run	100,455	0.17	1.00	1.00	3.185	4.695	1.00	1.00

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